C1 cont'd

reflector-type optical fiber functioning as an optical waveguide and having its reflection-peak wavelength adjusted to the Bragg wavelength. In this arrangement, the laser light emitting device 10 includes an active layer (not shown) and antireflection and high-reflection surfaces 11 and 12 formed on either side of the active layer. On the other hand, the FBG section 20 includes a lensed fiber having a first end facet 21 lensed in the shape of a hemispherical surface, a grating 22 formed in the fiber core, and a second end facet 23 that is equipped with a connector 30. In the laser constructed in this manner, light is generated in the active layer by injected current, and it is reflected by an external cavity, which is formed between the high reflection surface 12 and the grating 22, and is delivered as a laser beam from the second end facet 23 through the connector 30.

Parameters for the laser with this arrangement were set as follows. In the laser light emitting device 10, the field reflectance of the antireflection surface 11 was set at 10^{-4} or less, and the length from the antireflection surface 11 to the high-reflection surface 12 was adjusted to 600 μm or less. In the FBG section 20, the field reflectance and the full width at half maximum for the Bragg wavelength were set at 0.4 or less and 0.1 mm, respectively. The first end facet 21 was subjected to antireflection coating, its field reflectance was set at 0.4 or less, and the optical coupling efficiency was adjusted to 0.5.

FIG. 6 is a characteristic diagram showing a noise characteristic obtained from the experiment. Based on this result, the inventors hereof confirmed that the level of noise produced by connector connection, that is, the intensity level of reflected light that returns from the connector back to the laser, would inevitably influence the transmission band. Thereupon, the inventors hereof have measured the relative intensity noise (RIN) for the case where a physical connector (PC), superphysical connector (SPC), angled physical connector (APC) were connected individually to the second end facet 23 of the optical fiber. FIG. 7 is a diagram showing the results. For the case "NO ISOLATOR" shown in FIG. 7, RIN exceeded -130 dB/Hz irrespective of the connector type. Carrying out picture transmission in this state would result in lowered quality of picture transmission, with significant noise appearing on the screen.--

C1 cont'd

Please replace the paragraph at page 3, lines 16-20 with the following:

--The present invention has been contrived in consideration of these circumstances, and its object is to provide an external cavity laser capable of obtaining satisfactory transmission quality at all times irrespective of a connector or connectors to be connected.--

C2

Please replace the paragraph at page 4, lines 4-12 with the following:

C3

--Thus, according to the invention, the isolator on the optical path between the cavity and the connector absorbs and intercepts the reflected waves or reflected return light from the connector. Accordingly, the noise characteristic is improved so that the noise level has no influence upon signals in the transmission band irrespective of the connector to be connected. In consequence, satisfactory transmission quality can be obtained at all times.--

Please replace the paragraph at page 5, line 24 to page 6, line 10 with the following:

C4

--Referring now to FIG. 1, there is shown the external cavity laser according to the first embodiment, which, like the one shown in FIG. 5, is formed of a strained multi quantum well laser, for example. The external cavity laser comprises a laser light emitting device 10, which has an antireflection surface 11 and a high-reflection surface 12, and an FBG section 20, which has a lensed end facet 21 and a grating 22. Further, the external cavity laser includes optical lenses 25 and 26, an isolator 27 for use as intercepting means according to the invention, located between the lenses 25 and 26, and an optical fiber 28 having one end equipped with a connector 30, as well as the laser light emitting device 10 and the grating 22. A cavity 29 is formed

C4 Concl'd

between the high-reflection surface 12 of the device 10 and the grating 22. These components are arranged on the optical path of the FBG section 20. A light beam emitted from the device 10 is reflected and amplified by the cavity 29, and is outputted as a laser beam with a given wavelength defined by the Bragg wavelength through the isolator 27, optical fiber 28, and connector 30.--

Please replace the paragraphs at page 6, line 26 to page 7, line 24 with the following:

C5

--FIG. 2 is a characteristic diagram showing the noise characteristic of the external cavity laser. As seen from FIG. 2, noises were lowered to a level such that they never influence signals in the transmission band. PC, SPC, and APC were used for the connector 30. In any case, the relative intensity noise was lower than -150 dB/Hz, as shown in the diagram of FIG. 7 (see "WITH ISOLATOR"), so that the transmission quality was able to be improved.

Thus, according to this embodiment, the reflected waves from the connector are intercepted by the isolator that is located behind the FBG section. Consequently, the noise level has no influence upon the signals in the transmission band irrespective of the type of the connector to be connected, so that satisfactory transmission quality can be obtained at all times. Even in picture transmission, therefore, good picture

transmission quality can be maintained, and the screen can be prevented from suffering noises.

C5 cont'd

The parameters according to this embodiment are set only to conduct the aforementioned experiment, and the external cavity laser with the isolator according to the invention can be used with alternative set values. Even in the case where the isolation level of the isolator 27 is set at 60 dB or less, for example, the relative intensity noise can be improved, although the transmission quality is lowered in some measure. Thus, the external cavity laser of the invention can be satisfactorily applied to signal transmission in which the relative intensity noise is not a very important factor. Further, the relative intensity noise can be improved without restricting the invention to those alternative set parameter values.--

Please replace the paragraphs at page 8, lines 13-27 with the following:

C6

--Thus, according to this embodiment, the reflected waves from the connector are intercepted by the isolator that is located behind the laser light emitting device. As in the case of the first embodiment, therefore, satisfactory transmission quality can always be obtained irrespective of the type of the connector to be connected.

FIG. 4 shows a schematic configuration of an external cavity laser according to a third embodiment of the invention. As shown

C6 Concl'd

in FIG. 4, the third embodiment is constructed in the same manner as the first embodiment except that a unit 31 composed of the optical lenses 25 and 26 and the isolator 27 according to the first embodiment is connected to an FBG section 20. Further, the unit 31 is connected to an optical fiber 28 through an optical fiber 32 and a connector 33 in order to extend the optical waveguide.--

Please replace the paragraph at page 9, lines 5-12 with the following:

C7

--Thus, according to this embodiment, the reflected waves from a plurality of connectors can be intercepted by means of the isolator although the light guide is extended with use of the connectors. Consequently, the noise level has no influence upon the signals in the transmission band irrespective of the number of connectors to be connected, so that satisfactory transmission quality can be obtained at all times.--

Please replace the paragraph at page 9, lines 19-25 with the following:

C8

--Thus, according to embodiments described above, the reflected waves from the connector(s) are intercepted by means of the isolator that is located behind the external cavity formed between the laser light emitting device and the grating. Accordingly, satisfactory transmission quality can always be

obtained irrespective of the type or number of connector(s) to be connected.--

Please replace the paragraph at page 9, line 31 to page 10, line 19 with the following:

--As described herein, the external cavity laser of the invention comprises a fiber Bragg grating section formed of an optical fiber having the Bragg wavelength of light reflected by a grating adjusted to a given wavelength, a laser light emitting device designed to generate light, optically coupled to the fiber Bragg grating section to ensure input and output of the light, and including a reflective surface for reflecting the generated light, a cavity formed including the laser light emitting device and the grating and designed to resonate the light between the reflective surface of the last light emitting device and the grating, thereby oscillating a laser beam having a given oscillation wavelength through a connector. Further, the external cavity laser comprises intercepting means located on an optical path between the cavity and the connector. The intercepting means serves to intercept reflected waves from the connector directed to the laser light emitting device. Thus, according to the present invention, the noise level has no influence upon the signals in the transmission band irrespective of the connector(s) to be connected, so that satisfactory transmission quality can be obtained at all times.--